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VINYL ESTER RESINS AND PROCESS OF MAKING SAME.

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This invention relates broadly to the manufacture of synthetic gummy or resinous materials obtained by the interaction or treatment of bodies containing an ethylene linkage with saturated aliphatic aldehydes or aldehydic bodies, and relates more particularly to the manufacture of products by treatment of vinyl compounds, especially vinyl esters, with aldehydes.

In a prior application, Serial No. 147,183, filed the 8th November 1926, there is described a process of the foregoing character. The disclosure of this prior application is, however, limited to the treatment of vinyl esters with aldehydes and the proportions given in the examples are ten to fifteen parts of aldehyde to 100 parts of vinyl ester. The reaction is stated to be slow at ordinary temperatures and without pressure but to occur more rapidly under heat and pressure.

According to the present invention, bodies containing an ethylene linkage, hereinafter generally referred to as vinyl compounds, are reacted or treated with saturated aliphatic aldehydes or aldehydic bodies, hereafter generally designated by the term "aldehydes". The reaction proceeds slowly at ordinary atmospheric temperature and pressure but, by application of heat and superatmospheric pressure, the reaction is greatly accelerated and the desired products obtained in commercial quantities in from six to sixteen hours or more if a large proportion of aldehyde is present. The consistency of the product varies according to the proportion of aldehyde used, those bodies made with a small proportion of aldehyde being normally hard or tough and rubbery, while those made with larger proportions of aldehyde are gummy or sticky and semi-liquid or liquid, according as the proportion of aldehyde is increased. The presence of oxygen seems to have desirable effect on the yield and rapidity of the action. Some oxygen may be taken up during the reaction but the presence of oxygen, although desirable, does not seem to be entirely necessary.

The following examples will serve to illustrate various methods of carrying out the invention but it will be understood that the invention is not limited to these examples or to the proportions, materials or conditions set forth in the examples:—

Example I.

One-tenth of one part of acetaldehyde or slightly less is added to 100 parts of vinyl acetate (by volume), and the mixture placed in a bomb where it is heated for approximately sixteen hours at a temperature of approximately 100° C. Unchanged vinyl ester and any unchanged aldehyde that may remain are separated from the product by distillation in any suitable way, and about 66 parts of a product will be obtained which is hard when cold but of a tough, rubbery consistency when warm.

Example II.

Proceeding as in Example I but using from 1 to 5 parts of acetaldehyde to 100 parts of vinyl acetate, approximately 95 parts of product will be obtained, which is slightly softer than that resulting from the process of Example I.

Example III.

Proceeding as in Example I but using from 10 to 15 parts of aldehyde to 100 parts of vinyl acetate, between 90 and 80 parts of product is obtained, which is hard when cold but, when warmed to body temperature, softens to a readily kneadable and ductile condition of about the consistency of ordinary chewing gum and which has a capacity for taking up a certain amount of water.

Example IV.

Proceeding as in Example I but using 100 parts of acetaldehyde to 100 parts of vinyl acetate, there results after distillation approximately 12 parts of a product which is soft and sticky. If larger proportions of aldehyde are used, softer products are obtained.

Example V.

100 parts of vinyl formate is treated with